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REPORT NO. ATC-8982



STANDARDIZED

UXO TECHNOLOGY DEMONSTRATION SITE

OPEN FIELD SCORING RECORD NO. 442

SITE LOCATION:

U.S. ARMY YUMA PROVING GROUND

DEMONSTRATOR:

HUMAN FACTORS APPLICATIONS INC.  
8 JAY GOULD CT. UNIT D  
WALDORF, MD 20602

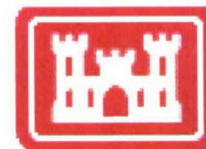
TECHNOLOGY TYPE/PLATFORM:

MAGNETOMETER SCHONSTEDT/HAND HELD

PREPARED BY:

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## **SECTION 1. GENERAL INFORMATION**

### **1.1 BACKGROUND**

Technologies under development for the detection and discrimination of unexploded ordnance (UXO) require testing so that their performance can be characterized. To that end, Standardized Test Sites have been developed at Aberdeen Proving Ground (APG), Maryland and U.S. Army Yuma Proving Ground (YPG), Arizona. These test sites provide a diversity of geology, climate, terrain, and weather as well as diversity in ordnance and clutter. Testing at these sites is independently administered and analyzed by the government for the purposes of characterizing technologies, tracking performance with system development, comparing performance of different systems, and comparing performance in different environments.

The Standardized UXO Technology Demonstration Site Program is a multi-agency program spearheaded by the U.S. Army Environmental Center (AEC). The U.S. Army Aberdeen Test Center (ATC) and the U.S. Army Corps of Engineers Engineering Research and Development Center (ERDC) provide programmatic support. The program is being funded and supported by the Environmental Security Technology Certification Program (ESTCP), the Strategic Environmental Research and Development Program (SERDP) and the Army Environmental Quality Technology Program (EQT).

### **1.2 SCORING OBJECTIVES**

The objective in the Standardized UXO Technology Demonstration Site Program is to evaluate the detection and discrimination capabilities of a given technology under various field and soil conditions. Inert munitions and clutter items are positioned in various orientations and depths in the ground.

The evaluation objectives are as follows:

- a. To determine detection and discrimination effectiveness under realistic scenarios that vary targets, geology, clutter, topography, and vegetation.
- b. To determine cost, time, and manpower requirements to operate the technology.
- c. To determine demonstrator's ability to analyze survey data in a timely manner and provide prioritized "Target Lists" with associated confidence levels.
- d. To provide independent site management to enable the collection of high quality, ground-truth, geo-referenced data for post-demonstration analysis.

#### **1.2.1 Scoring Methodology**

- a. The scoring of the demonstrator's performance is conducted in two stages. These two stages are termed the RESPONSE STAGE and DISCRIMINATION STAGE. For both stages, the probability of detection ( $P_d$ ) and the false alarms are reported as receiver-operating



characteristic (ROC) curves. False alarms are divided into those anomalies that correspond to emplaced clutter items, measuring the probability of false positive ( $P_{fp}$ ), and those that do not correspond to any known item, termed background alarms.

b. The RESPONSE STAGE scoring evaluates the ability of the system to detect emplaced targets without regard to ability to discriminate ordnance from other anomalies. For the blind grid RESPONSE STAGE, the demonstrator provides the scoring committee with a target response from each and every grid square along with a noise level below which target responses are deemed insufficient to warrant further investigation. This list is generated with minimal processing and, since a value is provided for every grid square, will include signals both above and below the system noise level.

c. The DISCRIMINATION STAGE evaluates the demonstrator's ability to correctly identify ordnance as such and to reject clutter. For the blind grid DISCRIMINATION STAGE, the demonstrator provides the scoring committee with the output of the algorithms applied in the discrimination-stage processing for each grid square. The values in this list are prioritized based on the demonstrator's determination that a grid square is likely to contain ordnance. Thus, higher output values are indicative of higher confidence that an ordnance item is present at the specified location. For digital signal processing, priority ranking is based on algorithm output. For other discrimination approaches, priority ranking is based on human (subjective) judgment. The demonstrator also specifies the threshold in the prioritized ranking that provides optimum performance, (i.e. that is expected to retain all detected ordnance and rejects the maximum amount of clutter).

d. The demonstrator is also scored on EFFICIENCY and REJECTION RATIO, which measures the effectiveness of the discrimination stage processing. The goal of discrimination is to retain the greatest number of ordnance detections from the anomaly list, while rejecting the maximum number of anomalies arising from non-ordnance items. EFFICIENCY measures the fraction of detected ordnance retained after discrimination, while the REJECTION RATIO measures the fraction of false alarms rejected. Both measures are defined relative to performance at the demonstrator-supplied level below which all responses are considered noise, i.e., the maximum ordnance detectable by the sensor and its accompanying false positive rate or background alarm rate.

e. Based on configuration of the ground truth at the standardized sites and the defined scoring methodology, there exists the possibility of having anomalies within overlapping halos and/or multiple anomalies within halos. In these cases, the following scoring logic is implemented:

(1) In situations where multiple anomalies exist within a single  $R_{halo}$ , the anomaly with the strongest response or highest ranking will be assigned to that particular ground truth item.

(2) For overlapping  $R_{halo}$  situations, ordnance has precedence over clutter. The anomaly with the strongest response or highest ranking that is closest to the center of a particular ground truth item gets assigned to that item. Remaining anomalies are retained until all matching is complete.

(3) Anomalies located within any  $R_{\text{halo}}$  that do not get associated with a particular ground truth item are thrown out and are not considered in the analysis.

f. All scoring factors are generated utilizing the Standardized UXO Probability and Plot Program, version 3.1.1.

### 1.2.2 Scoring Factors

Factors to be measured and evaluated as part of this demonstration include:

a. Response Stage ROC curves:

(1) Probability of Detection ( $P_d^{\text{res}}$ ).

(2) Probability of False Positive ( $P_{\text{fp}}^{\text{res}}$ ).

(3) Background Alarm Rate ( $\text{BAR}^{\text{res}}$ ) or Probability of Background Alarm ( $P_{\text{BA}}^{\text{res}}$ ).

b. Discrimination Stage ROC curves:

(1) Probability of Detection ( $P_d^{\text{disc}}$ ).

(2) Probability of False Positive ( $P_{\text{fp}}^{\text{disc}}$ ).

(3) Background Alarm Rate ( $\text{BAR}^{\text{disc}}$ ) or Probability of Background Alarm ( $P_{\text{BA}}^{\text{disc}}$ ).

c. Metrics:

(1) Efficiency (E).

(2) False Positive Rejection Rate ( $R_{\text{fp}}$ ).

(3) Background Alarm Rejection Rate ( $R_{\text{BA}}$ ).

d. Other:

(1) Probability of Detection by Size and Depth.

(2) Classification by type (i.e., 20-, 40-, 105-mm, etc.).

(3) Location accuracy.

(4) Equipment setup, calibration time and corresponding man-hour requirements.

(5) Survey time and corresponding man-hour requirements.

(6) Reacquisition/resurvey time and man-hour requirements (if any).



(7) Downtime due to system malfunctions and maintenance requirements.

### 1.3 STANDARD AND NONSTANDARD INERT ORDNANCE TARGETS

The standard and nonstandard ordnance items emplaced in the test areas are listed in Table 1. Standardized targets are members of a set of specific ordnance items that have identical properties to all other items in the set (caliber, configuration, size, weight, aspect ratio, material, filler, magnetic remanence, and nomenclature). Nonstandard targets are inert ordnance items having properties that differ from those in the set of standardized targets.

**TABLE 1. INERT ORDNANCE TARGETS**

<b>Standard Type</b>	<b>Nonstandard (NS)</b>
20-mm Projectile M55	20-mm Projectile M55
	20-mm Projectile M97
40-mm Grenades M385	40-mm Grenades M385
40-mm Projectile MKII Bodies	40-mm Projectile M813
BDU-28 Submunition	
BLU-26 Submunition	
M42 Submunition	
57-mm Projectile APC M86	
60-mm Mortar M49A3	60-mm Mortar (JPG)
	60-mm Mortar M49
2.75-inch Rocket M230	2.75-inch Rocket M230
	2.75-inch Rocket XM229
MK 118 ROCKEYE	
81-mm Mortar M374	81-mm Mortar (JPG)
	81-mm Mortar M374
105-mm HEAT Rounds M456	
105-mm Projectile M60	105-mm Projectile M60
155-mm Projectile M483A1	155-mm Projectile M483A
	500-lb Bomb

JPG = Jefferson Proving Ground

HEAT = high-explosive antitank

## **SECTION 2. DEMONSTRATION**

### **2.1 DEMONSTRATOR INFORMATION**

#### **2.1.1 Demonstrator Point of Contact (POC) and Address**

POC: Scott Hemstreet  
301-705-5044  
[shemstreet@hfactors.com](mailto:shemstreet@hfactors.com)

Address: Human Factors Associates Inc.  
8 Jay Gould Ct. Unit D  
Waldorf, MD 20602

#### **2.1.2 System Description (provided by demonstrator)**

Schonstedt 52Cx ordnance locator (fig 1). Schonstedt Magnetometers are ferrous metal locators and will only detect “iron” or magnetic materials. The size and orientation of the target and the soil characteristics of the work area limit the depth of detection. The instrument is not capable of classifying the anomaly; it will only indicate the presence or absence of a magnetic anomaly.

Schonstedt Magnetometers do not require calibration. They have a simple battery function test and a “Go”/“No Go” field operational check. The magnetometers will be set in accordance with the manufacturer’s handbook to the sensitivity required to detect subsurface anomalies on the project site.



Figure 1. Demonstrator system, MAG Schonstedt/hand held.



### **2.1.3 Data Processing Description (provided by demonstrator)**

The Human Factors Applications, Inc. (HFA) UXO team will place a plastic pin flag in the ground to record the location of a subsurface anomaly. ATC personnel will survey in the location of this flag to determine the accuracy of the "MAG and Flag" process.

### **2.1.4 Data Submission Format**

Data were submitted for scoring in accordance with data submission protocols outlined in the Standardized UXO Technology Demonstration Site Handbook. These submitted data are not included in this report in order to protect ground truth information.

### **2.1.5 Demonstrator Quality Assurance (QA) and Quality Control (QC) (provided by demonstrator)**

Magnetometer(s) will be tested daily before starting UXO operations in the morning. The UXO Technician III will perform random checks during daily operations to ensure the equipment is operating and being operated properly. If a magnetometer does not pass the daily check, it will be repaired or replaced.

The Master Rated UXO Technician (UXO Technician III) will perform a random QC survey over the entire project site. This random survey will include a 100% survey of a 10' radius around all sites where ordnance items have been located. If an ordnance item is discovered during the QC survey, 100% of the site will be resurveyed

Overview of Quality Assurance (QA): Test site to compare flagged anomaly locations to known locations of test items.

Demonstrator's Field Personnel: To be determined (TBD)

Support Equipment Required: ATC survey support

Frequency and Radio Utilization: None, cell phones or govt. radios for communications

### **2.1.6 Additional Records**

The following record(s) by this vendor can be accessed via the Internet as MicroSoft Word documents at [www.uxotestsites.org](http://www.uxotestsites.org). The Blind Grid counterpart to this report is Scoring Record No. 238.

## **2.2 YPG SITE INFORMATION**

### **2.2.1 Location**

YPG is located adjacent to the Colorado River in the Sonoran Desert. The UXO Standardized Test Site is located south of Pole Line Road and east of the Countermine Testing and Training Range. The Open Field range, Calibration Grid, Blind Grid, Mogul area, and Desert Extreme area comprise the 350 by 500-meter general test site area. The open field site is the largest of the test sites and measures approximately 200 by 350 meters. To the east of the open field range are the calibration and blind test grids that measure 30 by 40 meters and 40 by 40 meters, respectively. South of the Open Field is the 135- by 80-meter Mogul area consisting of a sequence of man-made depressions. The Desert Extreme area is located southeast of the open field site and has dimensions of 50 by 100 meters. The Desert Extreme area, covered with desert-type vegetation, is used to test the performance of different sensor platforms in a more severe desert conditions/environment.

### **2.2.2 Soil Type**

Soil samples were collected at the YPG UXO Standardized Test Site by ERDC to characterize the shallow subsurface (< 3 m). Both surface grab samples and continuous soil borings were acquired. The soils were subjected to several laboratory analyses, including sieve/hydrometer, water content, magnetic susceptibility, dielectric permittivity, X-ray diffraction, and visual description.

There are two soil complexes present within the site, Riverbend-Carrizo and Cristobal-Gunsight. The Riverbend-Carrizo complex is comprised of mixed stream alluvium, whereas the Cristobal-Gunsight complex is derived from fan alluvium. The Cristobal-Gunsight complex covers the majority of the site. Most of the soil samples were classified as either a sandy loam or loamy sand, with most samples containing gravel-size particles. All samples had a measured water content less than 7 percent, except for two that contained 11-percent moisture. The majority of soil samples had water content between 1 to 2 percent. Samples containing more than 3 percent were generally deeper than 1 meter.

An X-ray diffraction analysis on four soil samples indicated a basic mineralogy of quartz, calcite, mica, feldspar, magnetite, and some clay. The presence of magnetite imparted a moderate magnetic susceptibility, with volume susceptibilities generally greater than 100 by 10<sup>-5</sup> SI.

For more details concerning the soil properties at the YPG test site, go to [www.uxotestsites.org](http://www.uxotestsites.org) on the web to view the entire soils description report.



### 2.2.3 Test Areas

A description of the test site areas at YPG is included in Table 2.

**TABLE 2. TEST SITE AREAS**

<b>Area</b>	<b>Description</b>
Calibration Grid	Contains the 15 standard ordnance items buried in six positions at various angles and depths to allow demonstrator equipment calibration.
Blind Grid	Contains 400 grid cells in a 0.16-hectare (0.39-acre) site. The center of each grid cell contains ordnance, clutter, or nothing.
Open Field	A 4-hectare (10-acre) site containing open areas, dips, ruts, and obstructions, including vegetation.

### **SECTION 3. FIELD DATA**

#### **3.1 DATE OF FIELD ACTIVITIES (22, 23, 26 through 30 April and 3 through 7 May)**

#### **3.2 AREAS TESTED/NUMBER OF HOURS**

Areas tested and total number of hours operated at each site are summarized in Table 3.

**TABLE 3. AREAS TESTED AND  
NUMBER OF HOURS**

<b>Area</b>	<b>Number of Hours</b>
Calibration Lanes	12.75
Open Field	179.32

#### **3.3 TEST CONDITIONS**

##### **3.3.1 Weather Conditions**

A YPG weather station located approximately one mile west of the test site was used to record average temperature and precipitation on a half hour basis for each day of operation. The temperatures listed in Table 4 represent the average temperature during field operations from 0700 to 1700 hours while precipitation data represents a daily total amount of rainfall. Hourly weather logs used to generate this summary are provided in Appendix B.

**TABLE 4. TEMPERATURE/PRECIPITATION DATA SUMMARY**

<b>Date, 2004</b>	<b>Average Temperature, °C</b>	<b>Total Daily Precipitation, in.</b>
April 22	25.2	0.00
April 23	26.3	0.00
April 26	34.1	0.00
April 27	33.7	0.00
April 28	32.6	0.00
April 29	26.6	0.00
April 30	26.3	0.00
May 3	35.4	0.00
May 4	35.3	0.00
May 5	33.8	0.00
May 6	33.0	0.00
May 7	37.8	0.00

### **3.3.2 Field Conditions**

The field was dry and the temperature warm during the HFA survey.

### **3.3.3 Soil Moisture**

Three soil probes were placed at various locations within the site to capture soil moisture data: Blind Grid, Calibration, Desert Extreme, and Mogul areas. Measurements were collected in percent moisture and were taken twice daily (morning and afternoon) from five different soil depths (1 to 6 in., 6 to 12 in., 12 to 24 in., 24 to 36 in., and 36 to 48 in.) from each probe. Soil moisture logs are included in Appendix C.

## **3.4 FIELD ACTIVITIES**

### **3.4.1 Setup/Mobilization**

These activities included initial mobilization and daily equipment preparation and break down. A two-person crew took 1-hours and 20 minutes to perform the initial setup and mobilization. There was 51 hours and 55 minutes of daily equipment preparation and end of the day equipment break down lasted 3 hours and 10 minutes.

### **3.4.2 Calibration**

HFA spent a total of 12 hours and 45 minutes in the calibration lanes, of which 8 hours and 52 minutes was spent collecting data.

### **3.4.3 Downtime Occasions**

Occasions of downtime are grouped into five categories: equipment/data checks or equipment maintenance, equipment failure and repair, weather, Demonstration Site issues, or breaks/lunch. All downtime is included for the purposes of calculating labor costs (section 5) except for downtime due to Demonstration Site issues. Demonstration Site issues, while noted in the Daily Log, are considered non-chargeable downtime for the purposes of calculating labor costs and are not discussed. Breaks and lunches are discussed in this section and billed to the total Site Survey area.

**3.4.3.1 Equipment/data checks, maintenance.** Equipment data checks and maintenance activities accounted for no site usage time. These activities included changing out batteries and routine data checks to ensure the data was being properly recorded/collected. HFA spent an additional 32 hours and 59 minutes for breaks and lunches.

**3.4.3.2 Equipment failure or repair.** No time was needed to resolve equipment failures that occurred while surveying the Open Field.

**3.4.3.3 Weather.** No weather delays occurred during the survey.



#### **3.4.4 Data Collection**

HFA spent a total time of 179 hours and 19 minutes in the Open Field area, 91 hours and 15 minutes of which was spent collecting data.

#### **3.4.5 Demobilization**

The HFA survey crew went on to conducted a full demonstration of the site. Therefore, demobilization did not occur until 13 May 2004. On that day, it took the crew 4 hours to break down and pack up their equipment.

### **3.5 PROCESSING TIME**

HFA submitted the raw data from the demonstration activities on the last day of the demonstration, as required. The scoring submittal data was also provided within the required 30-day timeframe.

### **3.6 DEMONSTRATOR'S FIELD PERSONNEL**

Mr. Bob Dyminski  
Mr. Scott Hemstreet

### **3.7 DEMONSTRATOR'S FIELD SURVEYING METHOD**

HFA set up grids and collected data in a south to north direction.

### **3.8 SUMMARY OF DAILY LOGS**

Daily logs capture all field activities during this demonstration and are located in Appendix D. Activities pertinent to this specific demonstration are indicated in highlighted text.



## **SECTION 4. TECHNICAL PERFORMANCE RESULTS**

### **4.1 ROC CURVES USING ALL ORDNANCE CATEGORIES**

(Not applicable for this technology)

### **4.2 ROC CURVES USING ORDNANCE LARGER THAN 20 MM**

(Not applicable for this technology)

### **4.3 PERFORMANCE SUMMARIES**

Results for the Open Field test, broken out by size, depth and nonstandard ordnance, are presented in Tables 5a and 5b (for cost results, see section 5). Results by size and depth include both standard and nonstandard ordnance. The results by size show how well the demonstrator did at detecting/discriminating ordnance of a certain caliber range (see app A for size definitions). The results are relative to the number of ordnances emplaced. Depth is measured from the geometric center of anomalies.

The RESPONSE STAGE results are derived from the list of anomalies above the demonstrator-provided noise level. The results for the DISCRIMINATION STAGE are derived from the demonstrator's recommended threshold for optimizing UXO field cleanup by minimizing false digs and maximizing ordnance recovery. The lower 90-percent confidence limit on probability of detection and probability of false positive was calculated assuming that the number of detections and false positives are binomially distributed random variables. All results in Table 5a and 5b have been rounded to protect the ground truth. However, lower confidence limits were calculated using actual results.

The overall ground truth is composed of ferrous and non-ferrous anomalies. Due to limitations of the magnetometer, the non-ferrous items cannot be detected. Therefore, the summary presented in Table 5a exhibits results based on the subset of the ground truth that is solely the ferrous anomalies. Table 5b exhibits results based on the full ground truth. All other tables presented in this section are based on scoring against the ferrous only ground truth. The response stage noise level and recommended discrimination stage threshold values are provided by the demonstrator.

**TABLE 5a. SUMMARY OF OPEN FIELD RESULTS MAG SCHNONSTEDT  
(FERROUS ONLY)**

Metric	Overall	Standard	Nonstandard	By Size			By Depth, m		
				Small	Medium	Large	< 0.3	0.3 to <1	>= 1
RESPONSE STAGE									
P <sub>d</sub>	0.45	0.50	0.50	0.45	0.50	0.65	0.55	0.55	0.15
P <sub>d</sub> Low 90% Conf	0.44	0.48	0.45	0.41	0.45	0.57	0.50	0.49	0.08
P <sub>d</sub> Upper 90% Conf	0.50	0.56	0.54	0.50	0.56	0.71	0.59	0.60	0.25
P <sub>fp</sub>	0.25	-	-	-	-	-	0.65	0.60	N/A
P <sub>fp</sub> Low 90% Conf	0.22	-	-	-	-	-	0.61	0.54	N/A
P <sub>fp</sub> Upper 90% Conf	0.25	-	-	-	-	-	0.65	0.61	0.21
BAR	0.50	-	-	-	-	-	-	-	-
DISCRIMINATION STAGE									
P <sub>d</sub>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Low 90% Conf	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Upper 90% Conf	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>fp</sub>	N/A	-	-	-	-	-	N/A	N/A	N/A
P <sub>fp</sub> Low 90% Conf	N/A	-	-	-	-	-	N/A	N/A	N/A
P <sub>fp</sub> Upper 90% Conf	N/A	-	-	-	-	-			
BAR	N/A	-	-	-	-	-	-	-	-

Response Stage Noise Level: 0.00

Recommended Discrimination Stage Threshold: 0.00

**TABLE 5b. SUMMARY OF OPEN FIELD RESULTS MAG SCHNONSTEDT  
(FULL GROUND TRUTH)**

Metric	Overall	Standard	Nonstandard	By Size			By Depth, m		
				Small	Medium	Large	< 0.3	0.3 to <1	>= 1
RESPONSE STAGE									
P <sub>d</sub>	0.45	0.45	0.50	0.40	0.50	0.65	0.50	0.50	0.15
P <sub>d</sub> Low 90% Conf	0.43	0.40	0.45	0.34	0.45	0.57	0.44	0.45	0.08
P <sub>d</sub> Upper 90% Conf	0.49	0.48	0.54	0.42	0.56	0.71	0.52	0.56	0.24
P <sub>fp</sub>	0.60	-	-	-	-	-	0.65	0.55	N/A
P <sub>fp</sub> Low 90% Conf	0.59	-	-	-	-	-	0.61	0.54	N/A
P <sub>fp</sub> Upper 90% Conf	0.63	-	-	-	-	-	0.65	0.61	N/A
BAR	0.50	-	-	-	-	-	-	-	-
DISCRIMINATION STAGE									
P <sub>d</sub>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Low 90% Conf	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Upper 90% Conf	N/A			N/A	N/A	N/A	N/A	N/A	N/A
P <sub>fp</sub>	N/A	-	-	-	-	-	N/A	N/A	N/A
P <sub>fp</sub> Low 90% Conf	N/A	-	-	-	-	-	N/A	N/A	N/A
P <sub>fp</sub> Upper 90% Conf	N/A	-	-	-	-	-	N/A	N/A	N/A
BAR	N/A	-	-	-	-	-	-	-	-

Response Stage Noise Level: 0.00

Recommended Discrimination Stage Threshold 0.00

Note: The recommended discrimination stage threshold values are provided by the demonstrator.

No discrimination algorithm was applied. Therefore, the discrimination stage results are not applicable.



#### 4.4 EFFICIENCY, REJECTION RATES, AND TYPE CLASSIFICATION

Due to technical limitations of the system used for this demonstration, no attempt was made to discriminate. Therefore, the following tables presented in this section are not applicable.

Efficiency and rejection rates are calculated to quantify the discrimination ability at specific points of interest on the ROC curve: (1) at the point where no decrease in  $P_d$  is suffered (i.e., the efficiency is by definition equal to one) and (2) at the operator selected threshold. These values are reported in Table 6.

**TABLE 6. EFFICIENCY AND REJECTION RATES**

	<b>Efficiency (E)</b>	<b>False Positive Rejection Rate</b>	<b>Background Alarm Rejection Rate</b>
At Operating Point	N/A	N/A	N/A
With No Loss of $P_d$	N/A	N/A	N/A

At the demonstrator's recommended setting, the ordnance items that were detected and correctly discriminated were further scored on whether their correct type could be identified (table 7). Correct type examples include "20-mm projectile, 105-mm HEAT Projectile, and 2.75-inch Rocket". A list of the standard type declaration required for each ordnance item was provided to demonstrators prior to testing. For example, the standard type for the three example items are 20mmP, 105H, and 2.75in, respectively.

**TABLE 7. CORRECT TYPE CLASSIFICATION OF TARGETS CORRECTLY DISCRIMINATED AS UXO**

<b>Size</b>	<b>Percentage Correct</b>
Small	N/A
Medium	N/A
Large	N/A
Overall	N/A

#### 4.5 LOCATION ACCURACY

The mean location error and standard deviations appear in Table 8. These calculations are based on average missed depth for ordnance correctly identified in the discrimination stage. Depths are measured from the closest point of the ordnance to the surface. For the Blind Grid, only depth errors are calculated, since (X, Y) positions are known to be the centers of each grid square.



**TABLE 8. MEAN LOCATION ERROR AND  
STANDARD DEVIATION (M)**

	<b>Mean</b>	<b>Standard Deviation</b>
Northing	-0.02	0.15
Easting	-0.02	0.14
Depth	N/A	N/A

Note: Demonstrator did not attempt to declare depth of detection.

## **SECTION 5. ON-SITE LABOR COSTS**

A standardized estimate for labor costs associated with this effort was calculated as follows: the first person at the test site was designated "supervisor", the second person was designated "data analyst", and the third and following personnel were considered "field support". Standardized hourly labor rates were charged by title: supervisor at \$95.00/hour, data analyst at \$57.00/hour, and field support at \$28.50/hour.

Government representatives monitored on-site activity. All on-site activities were grouped into one of ten categories: initial setup/mobilization, daily setup/stop, calibration, collecting data, downtime due to break/lunch, downtime due to equipment failure, downtime due to equipment/data checks or maintenance, downtime due to weather, downtime due to demonstration site issue, or demobilization. See Appendix D for the daily activity log. See section 3.4 for a summary of field activities.

The standardized cost estimate associated with the labor needed to perform the field activities is presented in Table 9. Note that calibration time includes time spent in the Calibration Lanes as well as field calibrations. "Site survey time" includes daily setup/stop time, collecting data, breaks/lunch, downtime due to equipment/data checks or maintenance, downtime due to failure, and downtime due to weather.

**TABLE 9. ON-SITE LABOR COSTS**

	<b>No. People</b>	<b>Hourly Wage</b>	<b>Hours</b>	<b>Cost</b>
<b>Initial Setup</b>				
Supervisor	1	\$95.00	1.33	\$126.35
Data Analyst	1	57.00	1.33	75.81
Field Support	0	28.50	1.33	0.00
SubTotal				<b>\$202.16</b>
<b>Calibration</b>				
Supervisor	1	\$95.00	12.75	\$1,211.25
Data Analyst	1	57.00	12.75	726.75
Field Support	0	28.50	12.75	0.00
SubTotal				<b>\$1,938.00</b>
<b>Site Survey</b>				
Supervisor	1	\$95.00	179.32	\$17,035.40
Data Analyst	1	57.00	179.32	10,221.24
Field Support	0	28.50	179.32	0.00
SubTotal				<b>\$27,256.64</b>

See notes at end of table.

**TABLE 9 (CONT'D)**

	<b>No. People</b>	<b>Hourly Wage</b>	<b>Hours</b>	<b>Cost</b>
<b>Demobilization</b>				
Supervisor	1	\$95.00	4.0	\$380.00
Data Analyst	0	57.00	4.0	0.00
Field Support	0	28.50	4.0	0.00
Subtotal				<b>\$380.00</b>
Total				<b>\$29,776.80</b>

Notes: Calibration time includes time spent in the Calibration Lanes as well as calibration before each data run.

Site Survey time includes daily setup/stop time, collecting data, breaks/lunch, downtime due to system maintenance, failure, and weather.



## **SECTION 6. COMPARISON OF RESULTS TO BLIND GRID DEMONSTRATION** **(BASED ON FERROUS ONLY GROUND TRUTH)**

### **6.1 SUMMARY OF RESULTS FROM BLIND GRID DEMONSTRATION**

Table 10 shows the results from the Blind Grid survey conducted prior to surveying the Open Field during the same site visit in April of 2004. Due to the system utilizing magnetometer type sensors, all results presented in the following section have been based on performance scoring against the ferrous only ground truth anomalies. For more details on the Blind Grid survey results reference section 2.1.6.

**TABLE 10. SUMMARY OF BLIND GRID RESULTS FOR THE  
MAGNETOMETER SCHONSTEDT/HAND HELD (FERROUS ONLY)**

Metric	Overall	Standard	Nonstandard	By Size			By Depth, m		
				Small	Medium	Large	< 0.3	0.3 to <1	>= 1
RESPONSE STAGE									
P <sub>d</sub>	0.85	0.85	0.80	0.95	0.70	0.85	0.95	0.75	0.45
P <sub>d</sub> Low 90% Conf	0.76	0.74	0.68	0.82	0.54	0.66	0.86	0.62	0.17
P <sub>d</sub> Upper 90% Conf	0.89	0.91	0.91	0.98	0.82	0.96	0.99	0.89	0.72
P <sub>fp</sub>	0.95	-	-	-	-	-	0.95	1.00	N/A
P <sub>fp</sub> Low 90% Conf	0.94	-	-	-	-	-	0.92	0.92	-
P <sub>fp</sub> Upper 90% Conf	0.99	-	-	-	-	-	0.99	1.00	-
P <sub>ba</sub>	0.15	-	-	-	-	-	-	-	-
DISCRIMINATION STAGE									
P <sub>d</sub>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Low 90% Conf	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>d</sub> Upper 90% Conf	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
P <sub>fp</sub>	N/A	-	-	-	-	-	N/A	N/A	N/A
P <sub>fp</sub> Low 90% Conf	N/A	-	-	-	-	-	N/A	N/A	-
P <sub>fp</sub> Upper 90% Conf	N/A	-	-	-	-	-	N/A	N/A	-
P <sub>ba</sub>	N/A	-	-	-	-	-	-	-	-

### **6.2 COMPARISON OF ROC CURVES USING ALL ORDNANCE CATEGORIES**

(Not applicable for this technology)

### **6.3 COMPARISON OF ROC CURVES USING ORDNANCE LARGER THAN 20 MM**

(Not applicable for this technology)

## 6.4 STATISTICAL COMPARISONS

Statistical Chi-square significance tests were used to compare results between the Blind Grid and Open Field scenarios. The intent of the comparison is to determine if the feature introduced in each scenario has a degrading effect on the performance of the sensor system. However, any modifications in the UXO sensor system during the test, like changes in the processing or changes in the selection of the operating threshold, will also contribute to performance differences.

The Chi-square test for comparison between ratios was used at a significance level of 0.05 to compare Blind Grid to Open Field with regard to  $P_d^{res}$ ,  $P_d^{disc}$ ,  $P_{fp}^{res}$  and  $P_{fp}^{disc}$ , Efficiency and Rejection Rate. These results are presented in Table 11. A detailed explanation and example of the Chi-square application is located in Appendix A.

**TABLE 11. CHI-SQUARE RESULTS - BLIND GRID VERSUS OPEN FIELD**

<b>Metric</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>	<b>Overall</b>
$P_d^{res}$	Significant	Not Significant	Not Significant	Significant
$P_d^{disc}$	N/A	N/A	N/A	N/A
$P_{fp}^{res}$	Not Significant	Not Significant	Not Significant	Not Significant
$P_{fp}^{disc}$	-----	-----	-----	N/A
Efficiency	-----	-----	-----	N/A
Rejection rate	-----	-----	-----	N/A



## SECTION 7. APPENDIXES

### APPENDIX A. TERMS AND DEFINITIONS

#### GENERAL DEFINITIONS

Anomaly: Location of a system response deemed to warrant further investigation by the demonstrator for consideration as an emplaced ordnance item.

Detection: An anomaly location that is within  $R_{\text{halo}}$  of an emplaced ordnance item.

Emplaced Ordnance: An ordnance item buried by the government at a specified location in the test site.

Emplaced Clutter: A clutter item (i.e., non-ordnance item) buried by the government at a specified location in the test site.

$R_{\text{halo}}$ : A pre-determined radius about the periphery of an emplaced item (clutter or ordnance) within which a location identified by the demonstrator as being of interest is considered to be a response from that item. If multiple declarations lie within  $R_{\text{halo}}$  of any item (clutter or ordnance), the declaration with the highest signal output within the  $R_{\text{halo}}$  will be utilized. For the purpose of this program, a circular halo 0.5 meters in radius will be placed around the center of the object for all clutter and ordnance items less than 0.6 meters in length. When ordnance items are longer than 0.6 meters, the halo becomes an ellipse where the minor axis remains 1 meter and the major axis is equal to the length of the ordnance plus 1 meter.

Small Ordnance: Caliber of ordnance less than or equal to 40-mm (includes 20-mm projectile, 40-mm projectile, submunitions BLU-26, BLU-63, and M42).

Medium Ordnance: Caliber of ordnance greater than 40-mm and less than or equal to 81-mm (includes 57-mm projectile, 60-mm mortar, 2.75 in. Rocket, MK118 Rockeye, 81-mm mortar).

Large Ordnance: Caliber of ordnance greater than 81-mm (includes 105-mm HEAT, 105-mm projectile, 155-mm projectile, 500-pound bomb).

Shallow: Items buried less than 0.3 meter below ground surface.

Medium: Items buried greater than or equal to 0.3 meter and less than 1 meter below ground surface.

Deep: Items buried greater than or equal to 1 meter below ground surface.

Response Stage Noise Level: The level that represents the point below which anomalies are not considered detectable. Demonstrators are required to provide the recommended noise level for the Blind Grid test area.



Discrimination Stage Threshold: The demonstrator selected threshold level that they believe provides optimum performance of the system by retaining all detectable ordnance and rejecting the maximum amount of clutter. This level defines the subset of anomalies the demonstrator would recommend digging based on discrimination.

Binomially Distributed Random Variable: A random variable of the type which has only two possible outcomes, say success and failure, is repeated for  $n$  independent trials with the probability  $p$  of success and the probability  $1-p$  of failure being the same for each trial. The number of successes  $x$  observed in the  $n$  trials is an estimate of  $p$  and is considered to be a binomially distributed random variable.

## RESPONSE AND DISCRIMINATION STAGE DATA

The scoring of the demonstrator's performance is conducted in two stages. These two stages are termed the RESPONSE STAGE and DISCRIMINATION STAGE. For both stages, the probability of detection ( $P_d$ ) and the false alarms are reported as receiver operating characteristic (ROC) curves. False alarms are divided into those anomalies that correspond to emplaced clutter items, measuring the probability of false positive ( $P_{fp}$ ) and those that do not correspond to any known item, termed background alarms.

The RESPONSE STAGE scoring evaluates the ability of the system to detect emplaced targets without regard to ability to discriminate ordnance from other anomalies. For the RESPONSE STAGE, the demonstrator provides the scoring committee with the location and signal strength of all anomalies that the demonstrator has deemed sufficient to warrant further investigation and/or processing as potential emplaced ordnance items. This list is generated with minimal processing (e.g., this list will include all signals above the system noise threshold). As such, it represents the most inclusive list of anomalies.

The DISCRIMINATION STAGE evaluates the demonstrator's ability to correctly identify ordnance as such, and to reject clutter. For the same locations as in the RESPONSE STAGE anomaly list, the DISCRIMINATION STAGE list contains the output of the algorithms applied in the discrimination-stage processing. This list is prioritized based on the demonstrator's determination that an anomaly location is likely to contain ordnance. Thus, higher output values are indicative of higher confidence that an ordnance item is present at the specified location. For electronic signal processing, priority ranking is based on algorithm output. For other systems, priority ranking is based on human judgment. The demonstrator also selects the threshold that the demonstrator believes will provide "optimum" system performance, (i.e., that retains all the detected ordnance and rejects the maximum amount of clutter).

Note: The two lists provided by the demonstrator contain identical numbers of potential target locations. They differ only in the priority ranking of the declarations.

## RESPONSE STAGE DEFINITIONS

Response Stage Probability of Detection ( $P_d^{\text{res}}$ ):  $P_d^{\text{res}} = (\text{No. of response-stage detections})/(\text{No. of emplaced ordnance in the test site})$ .

Response Stage False Positive ( $fp^{\text{res}}$ ): An anomaly location that is within  $R_{\text{halo}}$  of an emplaced clutter item.

Response Stage Probability of False Positive ( $P_{fp}^{\text{res}}$ ):  $P_{fp}^{\text{res}} = (\text{No. of response-stage false positives})/(\text{No. of emplaced clutter items})$ .

Response Stage Background Alarm ( $ba^{\text{res}}$ ): An anomaly in a blind grid cell that contains neither emplaced ordnance nor an emplaced clutter item. An anomaly location in the open field or scenarios that is outside  $R_{\text{halo}}$  of any emplaced ordnance or emplaced clutter item.

Response Stage Probability of Background Alarm ( $P_{ba}^{\text{res}}$ ): Blind Grid only:  $P_{ba}^{\text{res}} = (\text{No. of response-stage background alarms})/(\text{No. of empty grid locations})$ .

Response Stage Background Alarm Rate ( $BAR^{\text{res}}$ ): Open Field only:  $BAR^{\text{res}} = (\text{No. of response-stage background alarms})/(\text{arbitrary constant})$ .

Note that the quantities  $P_d^{\text{res}}$ ,  $P_{fp}^{\text{res}}$ ,  $P_{ba}^{\text{res}}$ , and  $BAR^{\text{res}}$  are functions of  $t^{\text{res}}$ , the threshold applied to the response-stage signal strength. These quantities can therefore be written as  $P_d^{\text{res}}(t^{\text{res}})$ ,  $P_{fp}^{\text{res}}(t^{\text{res}})$ ,  $P_{ba}^{\text{res}}(t^{\text{res}})$ , and  $BAR^{\text{res}}(t^{\text{res}})$ .

## DISCRIMINATION STAGE DEFINITIONS

Discrimination: The application of a signal processing algorithm or human judgment to response-stage data that discriminates ordnance from clutter. Discrimination should identify anomalies that the demonstrator has high confidence correspond to ordnance, as well as those that the demonstrator has high confidence correspond to nonordnance or background returns. The former should be ranked with highest priority and the latter with lowest.

Discrimination Stage Probability of Detection ( $P_d^{\text{disc}}$ ):  $P_d^{\text{disc}} = (\text{No. of discrimination-stage detections})/(\text{No. of emplaced ordnance in the test site})$ .

Discrimination Stage False Positive ( $fp^{\text{disc}}$ ): An anomaly location that is within  $R_{\text{halo}}$  of an emplaced clutter item.

Discrimination Stage Probability of False Positive ( $P_{fp}^{\text{disc}}$ ):  $P_{fp}^{\text{disc}} = (\text{No. of discrimination stage false positives})/(\text{No. of emplaced clutter items})$ .

Discrimination Stage Background Alarm ( $ba^{\text{disc}}$ ): An anomaly in a blind grid cell that contains neither emplaced ordnance nor an emplaced clutter item. An anomaly location in the open field or scenarios that is outside  $R_{\text{halo}}$  of any emplaced ordnance or emplaced clutter item.



Discrimination Stage Probability of Background Alarm ( $P_{ba}^{disc}$ ):  $P_{ba}^{disc} = (\text{No. of discrimination-stage background alarms})/(\text{No. of empty grid locations})$ .

Discrimination Stage Background Alarm Rate ( $BAR^{disc}$ ):  $BAR^{disc} = (\text{No. of discrimination-stage background alarms})/(\text{arbitrary constant})$ .

Note that the quantities  $P_d^{disc}$ ,  $P_{fp}^{disc}$ ,  $P_{ba}^{disc}$ , and  $BAR^{disc}$  are functions of  $t^{disc}$ , the threshold applied to the discrimination-stage signal strength. These quantities can therefore be written as  $P_d^{disc}(t^{disc})$ ,  $P_{fp}^{disc}(t^{disc})$ ,  $P_{ba}^{disc}(t^{disc})$ , and  $BAR^{disc}(t^{disc})$ .

## RECEIVER-OPERATING CHARACTERISTIC (ROC) CURVES

ROC curves at both the response and discrimination stages can be constructed based on the above definitions. The ROC curves plot the relationship between  $P_d$  versus  $P_{fp}$  and  $P_d$  versus  $BAR$  or  $P_{ba}$  as the threshold applied to the signal strength is varied from its minimum ( $t_{min}$ ) to its maximum ( $t_{max}$ ) value.<sup>1</sup> Figure A-1 shows how  $P_d$  versus  $P_{fp}$  and  $P_d$  versus  $BAR$  are combined into ROC curves. Note that the “res” and “disc” superscripts have been suppressed from all the variables for clarity.

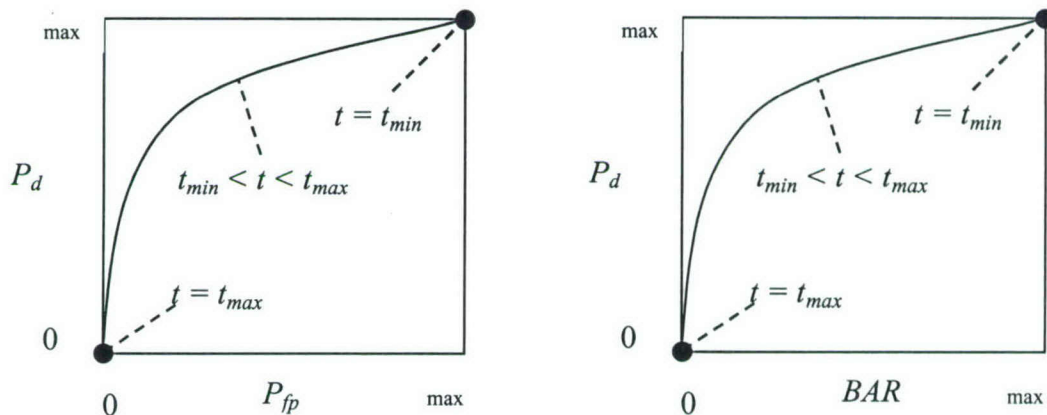


Figure A-1. ROC curves for open field testing. Each curve applies to both the response and discrimination stages.

<sup>1</sup>Strictly speaking, ROC curves plot the  $P_d$  versus  $P_{ba}$  over a pre-determined and fixed number of detection opportunities (some of the opportunities are located over ordnance and others are located over clutter or blank spots). In an open field scenario, each system suppresses its signal strength reports until some bare-minimum signal response is received by the system. Consequently, the open field ROC curves do not have information from low signal-output locations, and, furthermore, different contractors report their signals over a different set of locations on the ground. These ROC curves are thus not true to the strict definition of ROC curves as defined in textbooks on detection theory. Note, however, that the ROC curves obtained in the Blind Grid test sites are true ROC curves.



## METRICS TO CHARACTERIZE THE DISCRIMINATION STAGE

The demonstrator is also scored on efficiency and rejection ratio, which measure the effectiveness of the discrimination stage processing. The goal of discrimination is to retain the greatest number of ordnance detections from the anomaly list, while rejecting the maximum number of anomalies arising from nonordnance items. The efficiency measures the amount of detected ordnance retained by the discrimination, while the rejection ratio measures the fraction of false alarms rejected. Both measures are defined relative to the entire response list, i.e., the maximum ordnance detectable by the sensor and its accompanying false positive rate or background alarm rate.

Efficiency (E):  $E = P_d^{disc}(t^{disc})/P_d^{res}(t_{min}^{res})$ ; Measures (at a threshold of interest), the degree to which the maximum theoretical detection performance of the sensor system (as determined by the response stage  $t_{min}$ ) is preserved after application of discrimination techniques. Efficiency is a number between 0 and 1. An efficiency of 1 implies that all of the ordnance initially detected in the response stage was retained at the specified threshold in the discrimination stage,  $t^{disc}$ .

False Positive Rejection Rate ( $R_{fp}$ ):  $R_{fp} = 1 - [P_{fp}^{disc}(t^{disc})/P_{fp}^{res}(t_{min}^{res})]$ ; Measures (at a threshold of interest), the degree to which the sensor system's false positive performance is improved over the maximum false positive performance (as determined by the response stage  $t_{min}$ ). The rejection rate is a number between 0 and 1. A rejection rate of 1 implies that all emplaced clutter initially detected in the response stage were correctly rejected at the specified threshold in the discrimination stage.

Background Alarm Rejection Rate ( $R_{ba}$ ):

Blind Grid:  $R_{ba} = 1 - [P_{ba}^{disc}(t^{disc})/P_{ba}^{res}(t_{min}^{res})]$ .

Open Field:  $R_{ba} = 1 - [BAR^{disc}(t^{disc})/BAR^{res}(t_{min}^{res})]$ .

Measures the degree to which the discrimination stage correctly rejects background alarms initially detected in the response stage. The rejection rate is a number between 0 and 1. A rejection rate of 1 implies that all background alarms initially detected in the response stage were rejected at the specified threshold in the discrimination stage.

## CHI-SQUARE COMPARISON EXPLANATION:

The Chi-square test for differences in probabilities (or 2 x 2 contingency table) is used to analyze two samples drawn from two different populations to see if both populations have the same or different proportions of elements in a certain category. More specifically, two random samples are drawn, one from each population, to test the null hypothesis that the probability of event A (some specified event) is the same for both populations (ref 3).

A 2 x 2 contingency table is used in the Standardized UXO Technology Demonstration Site Program to determine if there is reason to believe that the proportion of ordnance correctly detected/discriminated by demonstrator X's system is significantly degraded by the more challenging terrain feature introduced. The test statistic of the 2 x 2 contingency table is the



Chi-square distribution with one degree of freedom. Since an association between the more challenging terrain feature and relatively degraded performance is sought, a one-sided test is performed. A significance level of 0.05 is chosen which sets a critical decision limit of 2.71 from the Chi-square distribution with one degree of freedom. It is a critical decision limit because if the test statistic calculated from the data exceeds this value, the two proportions tested will be considered significantly different. If the test statistic calculated from the data is less than this value, the two proportions tested will be considered not significantly different.

An exception must be applied when either a 0 or 100 percent success rate occurs in the sample data. The Chi-square test cannot be used in these instances. Instead, Fischer's test is used and the critical decision limit for one-sided tests is the chosen significance level, which in this case is 0.05. With Fischer's test, if the test statistic is less than the critical value, the proportions are considered to be significantly different.

Standardized UXO Technology Demonstration Site examples, where blind grid results are compared to those from the open field and open field results are compared to those from one of the scenarios, follow. It should be noted that a significant result does not prove a cause and effect relationship exists between the two populations of interest; however, it does serve as a tool to indicate that one data set has experienced a degradation in system performance at a large enough level than can be accounted for merely by chance or random variation. Note also that a result that is not significant indicates that there is not enough evidence to declare that anything more than chance or random variation within the same population is at work between the two data sets being compared.

Demonstrator X achieves the following overall results after surveying each of the three progressively more difficult areas using the same system (results indicate the number of ordnance detected divided by the number of ordnance emplaced):

	Blind Grid	Open Field	Moguls
$P_d^{res}$	100/100 = 1.0	8/10 = .80	20/33 = .61
$P_d^{disc}$	80/100 = 0.80	6/10 = .60	8/33 = .24

$P_d^{res}$ : BLIND GRID versus OPEN FIELD. Using the example data above to compare probabilities of detection in the response stage, all 100 ordnance out of 100 emplaced ordnance items were detected in the blind grid while 8 ordnance out of 10 emplaced were detected in the open field. Fischer's test must be used since a 100 percent success rate occurs in the data. Fischer's test uses the four input values to calculate a test statistic of 0.0075 that is compared against the critical value of 0.05. Since the test statistic is less than the critical value, the smaller response stage detection rate (0.80) is considered to be significantly less at the 0.05 level of significance. While a significant result does not prove a cause and effect relationship exists between the change in survey area and degradation in performance, it does indicate that the detection ability of demonstrator X's system seems to have been degraded in the open field relative to results from the blind grid using the same system.

$P_d^{disc}$ : BLIND GRID versus OPEN FIELD. Using the example data above to compare probabilities of detection in the discrimination stage, 80 out of 100 emplaced ordnance items were correctly discriminated as ordnance in blind grid testing while 6 ordnance out of 10 emplaced were correctly discriminated as such in open field-testing. Those four values are used to calculate a test statistic of 1.12. Since the test statistic is less than the critical value of 2.71, the two discrimination stage detection rates are considered to be not significantly different at the 0.05 level of significance.

$P_d^{res}$ : OPEN FIELD versus MOGULS. Using the example data above to compare probabilities of detection in the response stage, 8 out of 10 and 20 out of 33 are used to calculate a test statistic of 0.56. Since the test statistic is less than the critical value of 2.71, the two response stage detection rates are considered to be not significantly different at the 0.05 level of significance.

$P_d^{disc}$ : OPEN FIELD versus MOGULS. Using the example data above to compare probabilities of detection in the discrimination stage, 6 out of 10 and 8 out of 33 are used to calculate a test statistic of 2.98. Since the test statistic is greater than the critical value of 2.71, the smaller discrimination stage detection rate is considered to be significantly less at the 0.05 level of significance. While a significant result does not prove a cause and effect relationship exists between the change in survey area and degradation in performance, it does indicate that the ability of demonstrator X to correctly discriminate seems to have been degraded by the mogul terrain relative to results from the flat open field using the same system.



## APPENDIX B. DAILY WEATHER LOGS

### TABLE B-1. WEATHER LOG

Date & Time	Temperature C	Relative Humidity
4/19/2004 07:00:00	13.6	33
4/19/2004 08:00:00	16.9	41
4/19/2004 09:00:00	18.3	35
4/19/2004 10:00:00	20.3	30
4/19/2004 11:00:00	21.5	28
4/19/2004 12:00:00	22.9	20
4/19/2004 13:00:00	25.0	13
4/19/2004 14:00:00	25.6	12
4/19/2004 15:00:00	26.1	12
4/19/2004 16:00:00	26.1	12
4/19/2004 17:00:00	26.2	12
4/20/2004 07:00:00	14.9	36
4/20/2004 08:00:00	19.0	35
4/20/2004 09:00:00	21.0	32
4/20/2004 10:00:00	23.0	26
4/20/2004 11:00:00	25.3	19
4/20/2004 12:00:00	26.3	17
4/20/2004 13:00:00	27.1	14
4/20/2004 14:00:00	28.2	14
4/20/2004 15:00:00	28.5	15
4/20/2004 16:00:00	29.3	13
4/20/2004 17:00:00	28.8	13

Date & Time	Temperature C	Relative Humidity
4/21/2004 07:00:00	17.8	49
4/21/2004 08:00:00	20.1	44
4/21/2004 09:00:00	22.6	33
4/21/2004 10:00:00	24.8	27
4/21/2004 11:00:00	26.2	22
4/21/2004 12:00:00	27.4	22
4/21/2004 13:00:00	29.0	17
4/21/2004 14:00:00	29.7	14
4/21/2004 15:00:00	30.0	13
4/21/2004 16:00:00	31.2	12
4/21/2004 17:00:00	31.6	11
4/22/2004 07:00:00	18.4	44
4/22/2004 08:00:00	20.1	41
4/22/2004 09:00:00	22.8	28
4/22/2004 10:00:00	24.6	19
4/22/2004 11:00:00	26.0	15
4/22/2004 12:00:00	26.9	13
4/22/2004 13:00:00	27.0	12
4/22/2004 14:00:00	27.6	11
4/22/2004 15:00:00	27.5	8
4/22/2004 16:00:00	27.8	7
4/22/2004 17:00:00	27.6	5

Date & Time	Temperature C	Relative Humidity
4/23/2004 07:00:00	18.2	18
4/23/2004 08:00:00	22.4	17
4/23/2004 09:00:00	24.2	16
4/23/2004 10:00:00	25.2	16
4/23/2004 11:00:00	26.1	15
4/23/2004 12:00:00	27.2	13
4/23/2004 13:00:00	27.3	13
4/23/2004 14:00:00	28.0	13
4/23/2004 15:00:00	29.5	11
4/23/2004 16:00:00	29.7	10
4/23/2004 17:00:00	29.6	11
4/24/2004 07:00:00	21.7	21
4/24/2004 08:00:00	24.4	19
4/24/2004 09:00:00	26.1	17
4/24/2004 10:00:00	27.8	15
4/24/2004 11:00:00	29.0	14
4/24/2004 12:00:00	30.4	12
4/24/2004 13:00:00	31.7	11
4/24/2004 14:00:00	32.0	10
4/24/2004 15:00:00	32.4	10
4/24/2004 16:00:00	32.8	10
4/24/2004 17:00:00	33.1	9



Date & Time	Temperature C	Relative Humidity
4/25/2004 07:00:00	20.2	19
4/25/2004 08:00:00	25.0	15
4/25/2004 09:00:00	27.6	13
4/25/2004 10:00:00	30.5	11
4/25/2004 11:00:00	32.0	9
4/25/2004 12:00:00	33.6	8
4/25/2004 13:00:00	34.8	7
4/25/2004 14:00:00	35.3	7
4/25/2004 15:00:00	35.4	7
4/25/2004 16:00:00	35.8	7
4/25/2004 17:00:00	35.8	6
4/26/2004 07:00:00	22.5	14
4/26/2004 08:00:00	26.3	12
4/26/2004 09:00:00	32.0	8
4/26/2004 10:00:00	32.9	7
4/26/2004 11:00:00	34.4	6
4/26/2004 12:00:00	36.0	6
4/26/2004 13:00:00	37.0	6
4/26/2004 14:00:00	37.1	6
4/26/2004 15:00:00	37.5	6
4/26/2004 16:00:00	37.5	6
4/26/2004 17:00:00	37.9	5

Date & Time	Temperature C	Relative Humidity
4/27/2004 07:00:00	28.8	9
4/27/2004 08:00:00	30.2	9
4/27/2004 09:00:00	31.0	10
4/27/2004 10:00:00	32.5	10
4/27/2004 11:00:00	32.9	9
4/27/2004 12:00:00	33.7	11
4/27/2004 13:00:00	34.6	10
4/27/2004 14:00:00	36.0	9
4/27/2004 15:00:00	37.1	9
4/27/2004 16:00:00	37.2	9
4/27/2004 17:00:00	37.3	8
4/28/2004 07:00:00	22.0	28
4/28/2004 08:00:00	26.3	24
4/28/2004 09:00:00	29.4	19
4/28/2004 10:00:00	31.1	16
4/28/2004 11:00:00	32.4	14
4/28/2004 12:00:00	34.5	10
4/28/2004 13:00:00	35.4	10
4/28/2004 14:00:00	36.1	10
4/28/2004 15:00:00	36.6	9
4/28/2004 16:00:00	36.4	10
4/28/2004 17:00:00	36.7	8

Date & Time	Temperature C	Relative Humidity
4/29/2004 07:00:00	19.3	40
4/29/2004 08:00:00	20.9	35
4/29/2004 09:00:00	23.1	31
4/29/2004 10:00:00	25.1	21
4/29/2004 11:00:00	26.9	11
4/29/2004 12:00:00	28.0	9
4/29/2004 13:00:00	28.7	8
4/29/2004 14:00:00	29.0	8
4/29/2004 15:00:00	30.0	7
4/29/2004 16:00:00	30.1	8
4/29/2004 17:00:00	29.7	7
4/30/2004 07:00:00	20.7	16
4/30/2004 08:00:00	22.6	14
4/30/2004 09:00:00	23.9	12
4/30/2004 10:00:00	25.1	11
4/30/2004 11:00:00	25.8	10
4/30/2004 12:00:00	26.3	10
4/30/2004 13:00:00	27.3	9
4/30/2004 14:00:00	28.2	11
4/30/2004 15:00:00	28.9	12
4/30/2004 16:00:00	29.6	11
4/30/2004 17:00:00	30.0	11



Date & Time	Temperature C	Relative Humidity
5/1/2004 07:00:00	24.0	17
5/1/2004 08:00:00	27.1	14
5/1/2004 09:00:00	28.1	14
5/1/2004 10:00:00	29.8	13
5/1/2004 11:00:00	30.2	12
5/1/2004 12:00:00	31.8	12
5/1/2004 13:00:00	32.8	10
5/1/2004 14:00:00	33.7	10
5/1/2004 15:00:00	34.5	9
5/1/2004 16:00:00	34.6	9
5/1/2004 17:00:00	34.7	9
5/2/2004 07:00:00	22.0	15
5/2/2004 08:00:00	28.4	12
5/2/2004 09:00:00	30.6	11
5/2/2004 10:00:00	32.8	9
5/2/2004 11:00:00	34.3	8
5/2/2004 12:00:00	35.4	8
5/2/2004 13:00:00	36.0	8
5/2/2004 14:00:00	36.9	7
5/2/2004 15:00:00	37.1	7
5/2/2004 16:00:00	37.3	6
5/2/2004 17:00:00	37.4	6

Date & Time	Temperature C	Relative Humidity
5/3/2004 07:00:00	25.8	13
5/3/2004 08:00:00	29.9	10
5/3/2004 09:00:00	32.1	8
5/3/2004 10:00:00	34.3	7
5/3/2004 11:00:00	35.6	7
5/3/2004 12:00:00	36.8	7
5/3/2004 13:00:00	37.3	7
5/3/2004 14:00:00	38.0	7
5/3/2004 15:00:00	38.9	6
5/3/2004 16:00:00	38.8	6
5/3/2004 17:00:00	38.6	6
5/4/2004 07:00:00	24.1	13
5/4/2004 08:00:00	27.9	11
5/4/2004 09:00:00	31.7	10
5/4/2004 10:00:00	34.7	9
5/4/2004 11:00:00	35.8	8
5/4/2004 12:00:00	37.0	8
5/4/2004 13:00:00	38.0	7
5/4/2004 14:00:00	38.9	6
5/4/2004 15:00:00	39.2	6
5/4/2004 16:00:00	39.1	5
5/4/2004 17:00:00	38.8	5

Date & Time	Temperature C	Relative Humidity
5/3/2004 07:00:00	25.8	13
5/3/2004 08:00:00	29.9	10
5/3/2004 09:00:00	32.1	8
5/3/2004 10:00:00	34.3	7
5/3/2004 11:00:00	35.6	7
5/3/2004 12:00:00	36.8	7
5/3/2004 13:00:00	37.3	7
5/3/2004 14:00:00	38.0	7
5/3/2004 15:00:00	38.9	6
5/3/2004 16:00:00	38.8	6
5/3/2004 17:00:00	38.6	6
5/4/2004 07:00:00	24.1	13
5/4/2004 08:00:00	27.9	11
5/4/2004 09:00:00	31.7	10
5/4/2004 10:00:00	34.7	9
5/4/2004 11:00:00	35.8	8
5/4/2004 12:00:00	37.0	8
5/4/2004 13:00:00	38.0	7
5/4/2004 14:00:00	38.9	6
5/4/2004 15:00:00	39.2	6
5/4/2004 16:00:00	39.1	5
5/4/2004 17:00:00	38.8	5



Date & Time	Temperature C	Relative Humidity
5/5/2004 07:00:00	24.9	17
5/5/2004 08:00:00	28.0	15
5/5/2004 09:00:00	29.9	14
5/5/2004 10:00:00	32.7	11
5/5/2004 11:00:00	33.8	10
5/5/2004 12:00:00	35.1	10
5/5/2004 13:00:00	35.8	9
5/5/2004 14:00:00	36.9	8
5/5/2004 15:00:00	37.3	8
5/5/2004 16:00:00	37.4	8
5/5/2004 17:00:00	37.2	8
5/6/2004 07:00:00	23.8	11
5/6/2004 08:00:00	29.1	9
5/6/2004 09:00:00	30.0	8
5/6/2004 10:00:00	31.8	8
5/6/2004 11:00:00	33.4	8
5/6/2004 12:00:00	34.5	8
5/6/2004 13:00:00	35.1	8
5/6/2004 14:00:00	35.8	8
5/6/2004 15:00:00	35.8	8
5/6/2004 16:00:00	35.9	8
5/6/2004 17:00:00	36.0	8

Date & Time	Temperature C	Relative Humidity
5/7/2004 07:00:00	22.6	19
5/7/2004 08:00:00	27.2	17
5/7/2004 09:00:00	30.2	13
5/7/2004 10:00:00	31.3	11
5/7/2004 11:00:00	33.1	11
5/7/2004 12:00:00	34.7	10
5/7/2004 13:00:00	35.8	10
5/7/2004 14:00:00	35.6	10
5/7/2004 15:00:00	36.2	10
5/7/2004 16:00:00	35.7	10
5/7/2004 17:00:00	35.9	9
5/8/2004 07:00:00	23.5	25
5/8/2004 08:00:00	27.6	24
5/8/2004 09:00:00	29.0	22
5/8/2004 10:00:00	31.4	17
5/8/2004 11:00:00	33.1	14
5/8/2004 12:00:00	34.4	12
5/8/2004 13:00:00	35.9	11
5/8/2004 14:00:00	36.8	10
5/8/2004 15:00:00	37.5	10
5/8/2004 16:00:00	37.7	9
5/8/2004 17:00:00	37.5	10

Date & Time	Temperature C	Relative Humidity
5/9/2004 07:00:00	22.9	29
5/9/2004 08:00:00	27.1	21
5/9/2004 09:00:00	29.8	17
5/9/2004 10:00:00	31.5	13
5/9/2004 11:00:00	32.9	12
5/9/2004 12:00:00	34.7	10
5/9/2004 13:00:00	35.6	10
5/9/2004 14:00:00	36.5	10
5/9/2004 15:00:00	36.9	10
5/9/2004 16:00:00	37.4	9
5/9/2004 17:00:00	36.9	9
5/10/2004 07:00:00	22.5	24
5/10/2004 08:00:00	25.2	23
5/10/2004 09:00:00	28.5	22
5/10/2004 10:00:00	31.1	21
5/10/2004 11:00:00	33.0	18
5/10/2004 12:00:00	34.5	15
5/10/2004 13:00:00	35.4	15
5/10/2004 14:00:00	35.5	15
5/10/2004 15:00:00	35.9	14
5/10/2004 16:00:00	35.4	14
5/10/2004 17:00:00	35.0	14



Date & Time	Temperature C	Relative Humidity
5/11/2004 07:00:00	22.9	29
5/9/2004 08:00:00	27.1	21
5/9/2004 09:00:00	29.8	17
5/9/2004 10:00:00	31.5	13
5/9/2004 11:00:00	32.9	12
5/9/2004 12:00:00	34.7	10
5/9/2004 13:00:00	35.6	10
5/9/2004 14:00:00	36.5	10
5/9/2004 15:00:00	36.9	10
5/9/2004 16:00:00	37.4	9
5/9/2004 17:00:00	36.9	9
5/10/2004 07:00:00	22.5	24
5/10/2004 08:00:00	25.2	23
5/10/2004 09:00:00	28.5	22
5/10/2004 10:00:00	31.1	21
5/10/2004 11:00:00	33.0	18
5/10/2004 12:00:00	34.5	15
5/10/2004 13:00:00	35.4	15
5/10/2004 14:00:00	35.5	15
5/10/2004 15:00:00	35.9	14
5/10/2004 16:00:00	35.4	14
5/10/2004 17:00:00	35.0	14

Date & Time	Temperature C	Relative Humidity
5/11/2004 07:00:00	21.5	53
5/11/2004 08:00:00	23.0	52
5/11/2004 09:00:00	24.8	30
5/11/2004 10:00:00	26.2	28
5/11/2004 11:00:00	27.8	22
5/11/2004 12:00:00	28.9	24
5/11/2004 13:00:00	30.0	20
5/11/2004 14:00:00	30.9	20
5/11/2004 15:00:00	31.9	19
5/11/2004 16:00:00	32.4	15
5/12/2004 17:00:00	32.4	10
5/12/2004 07:00:00	20.0	38
5/12/2004 08:00:00	22.8	27
5/12/2004 09:00:00	24.9	15
5/12/2004 10:00:00	26.1	14
5/12/2004 11:00:00	27.5	13
5/12/2004 12:00:00	28.4	12
5/12/2004 13:00:00	29.1	12
5/12/2004 14:00:00	29.6	11
5/12/2004 15:00:00	29.7	10
5/12/2004 16:00:00	30.3	9
5/12/2004 17:00:00	30.3	9

## APPENDIX C. SOIL MOISTURE

Date: 4/19/2004

Times: 0950 hours, 1300 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.7	1.7
	6 to 12	2.0	2.0
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.0	2.0
	12 to 24	3.5	3.5
	24 to 36	3.9	3.9
	36 to 48	4.1	4.1

Date: 4/20/2004

Times: 0705 hours, 1300 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.7	1.7
	6 to 12	2.0	2.0
	12 to 24	3.6	3.6
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1



Date: 4/21/2004

Times: 0700 hours, 1250 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.4
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.7	1.7
	6 to 12	2.0	2.0
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.5	1.5
	6 to 12	2.1	2.2
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 4/22/2004

Times: 0705 hours, 1300 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.9	3.9
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 4/23/2004

Times: 0625 hours, 1300 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.5	1.5
	6 to 12	2.2	2.2
	12 to 24	3.6	3.6
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.0	2.0
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 4/26/2004

Times: 0610 hours, 1230 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.5	1.5
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.0	4.1

Date: 4/27/2004

Times: 0550 hours, 1200 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.2	2.2
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.5	1.5
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	1.8	1.8
	36 to 48	2.2	2.2

Date: 4/28/2004

Times: 0550 hours, 1230 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.9	3.9
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1



Date: 4/29/2004

Times: 0550 hours, 1200 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 4/30/2004

Times: 0600 hours, 1230 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/3/2004

Times: 0555 hours, 1200 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.6	1.6
	6 to 12	2.2	2.2
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.5	1.5
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/4/2004

Times: 0555 hours, 1230 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.7	1.7
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/5/2004

Times: 0545 hours, 1130 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.7	1.7
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/6/2004

Times: 0550 hours, 1145 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.2	2.2
	12 to 24	3.9	3.9
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1



Date: 5/7/2004

Times: 0555 hours, 1130 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.7	1.7
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/10/2004

Times: 0600 hours, 1230 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.2	2.2
	12 to 24	3.9	3.9
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/11/2004

Times: 0545 hours, 1130 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.7	1.7
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/12/2004

Times: 0545 hours, 1130 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.8	1.8
	6 to 12	2.3	2.3
	12 to 24	3.8	3.8
	24 to 36	3.6	3.6
	36 to 48	4.0	4.0
Mogul Area	0 to 6	1.6	1.6
	6 to 12	2.1	2.1
	12 to 24	3.7	3.7
	24 to 36	4.0	4.0
	36 to 48	4.0	4.0
Desert Extreme Area	0 to 6	1.7	1.7
	6 to 12	2.1	2.1
	12 to 24	3.5	3.5
	24 to 36	4.0	4.0
	36 to 48	4.1	4.1

Date: 5/13/2004

Times: 0535 hours, 1130 hours

Probe Location:	Layer, in.	AM Reading, %	PM Reading, %
Calibration Area	0 to 6	1.5	NA
	6 to 12	2.2	NA
	12 to 24	3.9	NA
	24 to 36	3.6	NA
	36 to 48	4.0	NA
Mogul Area	0 to 6	1.6	NA
	6 to 12	2.1	NA
	12 to 24	3.7	NA
	24 to 36	4.0	NA
	36 to 48	4.0	NA
Desert Extreme Area	0 to 6	1.7	NA
	6 to 12	2.1	NA
	12 to 24	3.5	NA
	24 to 36	4.0	NA
	36 to 48	4.1	NA



# APPENDIX D. DAILY ACTIVITY LOG

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
04/21/2004	1	BLIND TEST GRID	1305	1510	125	COLLECT DATA	COLLECT DATA SOUTH TO NORTH TOTAL 469 HITS	NA	CHIP	LINEAR	SUNNY
04/21/2004	1	BLIND TEST GRID	1510	1520	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	0700	0850	110	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	0850	0920	30	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	0920	0930	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	0930	0941	11	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	0941	1115	94	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1115	1140	25	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1140	1200	20	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1200	1255	55	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1255	1305	10	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1305	1355	50	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/22/2004	1	OPEN FIELD	1355	1402	7	SETUP/DAILY START/ STOP/CALIBRATION	SETUP MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY HOT WINDY
04/22/2004	1	OPEN FIELD	1402	1440	38	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY HOT WINDY
04/22/2004	1	OPEN FIELD	1440	1455	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT WINDY
04/22/2004	1	OPEN FIELD	1455	1525	30	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY HOT WINDY
04/22/2004	1	OPEN FIELD	1525	1535	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT WINDY
04/23/2004	1	OPEN FIELD	0630	0705	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	0705	0810	65	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	0810	0820	10	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	0820	0835	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	0835	0930	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	0930	0945	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	0945	1005	20	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/23/2004	1	OPEN FIELD	1005	1118	73	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	1118	1135	17	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	1135	1145	10	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	1145	1245	60	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	1245	1303	18	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	1303	1420	77	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	1420	1432	12	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/23/2004	1	OPEN FIELD	1432	1503	31	COLLECT DATA	COLLECT DATA SOUTH TO NORTH B2 258 CHIPS	GPS	NA	LINEAR	SUNNY WARM
04/23/2004	1	OPEN FIELD	1503	1515	12	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0610	0805	115	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0805	0815	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/26/2004	1	OPEN FIELD	0815	0924	69	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY WARM
04/26/2004	1	OPEN FIELD	0924	0948	24	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0948	1005	17	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	1005	1120	75	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY HOT
04/26/2004	1	OPEN FIELD	1120	1210	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/26/2004	1	OPEN FIELD	1210	1240	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY HOT
04/26/2004	1	OPEN FIELD	1240	1325	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY HOT
04/26/2004	1	OPEN FIELD	1325	1340	15	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	0600	0720	80	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D2	NA	NA	NA	SUNNY WARM
04/27/2004	1	OPEN FIELD	0720	0845	85	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY WARM
04/27/2004	1	OPEN FIELD	0845	0855	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
04/27/2004	1	OPEN FIELD	0855	0935	40	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	0935	0946	11	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	0946	1035	49	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D2	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1035	1130	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	1130	1220	50	BREAK/LUNCH	TOTAL 256 HITS LUNCH	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1220	1254	34	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1254	1350	56	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	1350	1400	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	0600	0624	24	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY WARM
04/28/2004	1	OPEN FIELD	0624	0718	54	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2	NA	CHIP	LINEAR	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/28/2004	1	OPEN FIELD	0718	0734	16	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY WARM
04/28/2004	1	OPEN FIELD	0734	0835	61	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2 TOTAL 233 HITS	NA	CHIP	LINEAR	SUNNY WARM
04/28/2004	1	OPEN FIELD	0835	0848	13	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	0848	0925	37	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F2	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	0925	1045	80	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID F2	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1045	1200	75	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1200	1206	6	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F2	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1206	1252	46	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F2 TOTAL 165 HITS	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1252	1305	13	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1305	1335	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/28/2004	1	OPEN FIELD	1335	1402	27	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1402	1415	13	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	0605	0618	13	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0618	0657	39	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2	NA	CHIP	LINEAR	SUNNY WARM
04/29/2004	1	OPEN FIELD	0657	0714	17	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0714	0800	46	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2 TOTAL 155 HITS	NA	CHIP	LINEAR	SUNNY WARM
04/29/2004	1	OPEN FIELD	0800	0818	18	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0818	0858	40	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G3	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/29/2004	1	OPEN FIELD	0858	1011	73	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G3	NA	CHIP	LINEAR	SUNNY HOT
04/29/2004	1	OPEN FIELD	1011	1028	17	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1028	1042	14	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F3	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1042	1121	39	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G3	NA	CHIP	LINEAR	SUNNY HOT
04/29/2004	1	OPEN FIELD	1121	1215	54	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1215	1243	28	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F3	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1243	1348	65	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F3	NA	CHIP	LINEAR	SUNNY HOT
04/29/2004	1	OPEN FIELD	1348	1400	12	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
04/30/2004	1	OPEN FIELD	0605	0657	52	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0657	0741	44	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F3	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	0741	0753	12	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0753	0818	25	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0818	0928	70	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID E3	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	0928	0949	21	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0949	1008	19	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	1008	1039	31	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	1039	1151	72	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D3	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	1151	1251	60	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/30/2004	1	OPEN FIELD	1251	1317	25	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	1317	1330	13	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D3 TOTAL 110 HITS	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	1330	1415	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	1415	1425	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY WARM
05/03/2004	1	OPEN FIELD	0605	0623	18	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C3	NA	NA	NA	SUNNY WARM
05/03/2004	1	OPEN FIELD	0623	0814	111	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID C3 TOTAL 113 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/03/2004	1	OPEN FIELD	0814	0830	16	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/03/2004	1	OPEN FIELD	0830	0905	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID B3	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/03/2004	1	OPEN FIELD	0905	1020	75	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID B3 TOTAL 105 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/03/2004	1	OPEN FIELD	1020	1050	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A3	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1050	1150	60	BREAK/LUNCH	LUNCH GRID A3	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1150	1313	83	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A3	NA	CHIP	LINEAR	SUNNY HOT
05/03/2004	1	OPEN FIELD	1313	1327	14	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1327	1400	33	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1400	1405	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0605	0645	40	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY WARM
05/04/2004	1	OPEN FIELD	0645	0810	85	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A4	NA	CHIP	LINEAR	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/04/2004	1	OPEN FIELD	0810	0818	8	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY WARM
05/04/2004	1	OPEN FIELD	0818	0838	20	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A4	NA	CHIP	LINEAR	SUNNY WARM
05/04/2004	1	OPEN FIELD	0838	0855	17	BREAK/LUNCH	TOTAL 153 HITS BREAK	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0855	0940	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID B4	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	0940	0950	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0950	1118	88	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID B4	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	1118	1218	60	BREAK/LUNCH	TOTAL 108 HITS LUNCH	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	1218	1257	39	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C4	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	1257	1410	73	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID C4	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	1410	1415	5	SETUP/DAILY START/ STOP/CALIBRATION	TOTAL 90 HITS END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
05/05/2004	1	OPEN FIELD	0615	0710	55	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D4	NA	NA	N/A	SUNNY WARM
05/05/2004	1	OPEN FIELD	0710	0830	80	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D4 TOTAL 113 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/05/2004	1	OPEN FIELD	0830	0845	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/05/2004	1	OPEN FIELD	0845	0920	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E4	NA	NA	NA	SUNNY WARM
05/05/2004	1	OPEN FIELD	0920	1050	90	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D4 TOTAL 159 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/05/2004	1	OPEN FIELD	1050	1115	25	BREAK/LUNCH	BREAK	NA	NA	N/A	SUNNY HOT
05/05/2004	1	OPEN FIELD	1115	1150	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F4	NA	NA	N/A	SUNNY HOT
05/05/2004	1	OPEN FIELD	1150	1240	50	BREAK/LUNCH	LUNCH	NA	NA	N/A	SUNNY HOT
05/05/2004	1	OPEN FIELD	1240	1350	70	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F4 TOTAL 101 HITS	NA	CHIP	LINEAR	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/05/2004	1	OPEN FIELD	1350	1400	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	0610	0655	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G4	NA	NA	NA	SUNNY WARM
05/06/2004	1	OPEN FIELD	0655	0727	32	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G4 TOTAL 53 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/06/2004	1	OPEN FIELD	0727	0810	43	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F5	NA	NA	NA	SUNNY WARM
5/06/2004	1	OPEN FIELD	0810	0825	15	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F5 TOTAL 27 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0850	0957	67	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID H7 TOTAL 17 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/11/2004	1	YUMA EXTREME	0957	1030	33	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/11/2004	1	MOGUL	1030	1155	85	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID J1/J2	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/11/2004	1	MOGUL	1155	1245	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY
05/11/2004	1	MOGUL	1245	1405	80	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA MOGUL	NA	NA	NA	SUNNY
05/11/2004	1	MOGUL	1405	1410	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY
05/12/2004	1	MOGUL	0545	0613	28	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS J1/J2, AND J3	NA	NA	NA	SUNNY
05/12/2004	1	MOGUL	0613	0737	84	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID J1 AND J2	NA	CHIP	LINEAR	SUNNY
05/12/2004	1	MOGUL	0737	0745	8	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
05/12/2004	1	MOGUL	0745	0844	59	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRIDS J1/J2, AND J3 TOTAL 181 HITS	NA	CHIP	LINEAR	SUNNY
05/12/2004	1	MOGUL	0844	0905	21	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
05/12/2004	1	MOGUL	0905	0955	50	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS J1/J2, AND J3	NA	NA	NA	SUNNY
05/12/2004	1	MOGUL	0955	1100	65	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY
											HOT



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/12/2004	1	MOGUL	1100	1304	124	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRIDS I1/I2 AND I3 TOTAL 164 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/12/2004	1	MOGUL	1304	1320	16	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/13/2004	1	MOGUL	0535	0623	48	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS H1/H2 AND H3	NA	NA	NA	SUNNY WARM
05/13/2004	1	MOGUL	0623	0815	112	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID H1/H2 AND H3 TOTAL 143 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/13/2004	1	MOGUL	0815	1215	240	DEMOBILIZATION	END OF TEST	NA	NA	NA	SUNNY HO
04/19/2004	2	CALIBRATION LANES	0950	1110	80	INITIAL SETUP	SETUP/ MOBILIZATION	NA	NA	NA	SUNNY COOL
04/19/2004	2	CALIBRATION LANES	1110	1220	70	COLLECT DATA	COLLECT DATA BIDIRECTIONAL EAST TO WEST	NA	FLAG	LINEAR	SUNNY WARM
04/19/2004	2	CALIBRATION LANES	1220	1320	60	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY WARM
04/19/2004	2	CALIBRATION LANES	1320	1420	60	COLLECT DATA	COLLECT DATA BIDIRECTIONAL NORTH TO SOUTH	NA	NA	NA	SUNNY WARM
04/19/2004	2	CALIBRATION LANES	1420	1430	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/19/2004	2	CALIBRATION LANES	1430	1525	55	COLLECT DATA	COLLECT DATA BIDIRECTIONAL NORTH TO SOUTH	NA	FLAG	LINEAR	SUNNY WARM
04/19/2004	2	CALIBRATION LANES	1525	1535	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY WARM
04/20/2004	2	CALIBRATION LANES	0705	0730	25	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION	NA	NA	NA	SUNNY WARM
04/20/2004	2	CALIBRATION LANES	0730	0835	65	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	SUNNY WARM
04/20/2004	2	CALIBRATION LANES	0835	0845	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/20/2004	2	CALIBRATION LANES	0845	1005	80	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	SUNNY WARM
04/20/2004	2	CALIBRATION LANES	1005	1025	20	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1025	1205	100	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1205	1243	38	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1243	1343	60	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1343	1405	22	BREAK/LUNCH	LUNCH	NA	FLAG	LINEAR	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1405	1447	42	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1447	1520	33	DOWNTIME DUE TO EQUIP MAIN/CHECK	CHECKING DATA TOTAL FLAG COUNT 571	NA	NA	NA	SUNNY HOT
04/20/2004	2	CALIBRATION LANES	1520	1525	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/21/2004	2	BLIND TEST GRID	0645	0705	20	SETUP/DAILY START/ STOP/CALIBRATION	MOBILIZATION	NA	NA	NA	WARM
04/21/2004	2	BLIND TEST GRID	0705	0858	113	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	FLAG	LINEAR	WARM
04/21/2004	2	BLIND TEST GRID	0858	0920	22	BREAK/LUNCH	BREAK	NA	NA	NA	WARM
04/21/2004	2	BLIND TEST GRID	0920	1100	100	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	HOT
04/21/2004	2	BLIND TEST GRID	1100	1120	20	BREAK/LUNCH	BREAK	NA	NA	NA	HOT
04/21/2004	2	BLIND TEST GRID	1120	1210	50	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	HOT
04/21/2004	2	BLIND TEST GRID	1210	1305	55	BREAK/LUNCH	LUNCH	NA	NA	NA	HOT
04/21/2004	1	BLIND TEST GRID	1305	1510	125	COLLECT DATA	COLLECT DATA SOUTH TO NORTH TOTAL 469 HITS	NA	CHIP	LINEAR	HOT
04/21/2004	1	BLIND TEST GRID	1510	1520	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	HOT
04/22/2004	1	OPEN FIELD	0700	0850	110	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	WARM
04/22/2004	1	OPEN FIELD	0850	0920	30	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	WARM
04/22/2004	1	OPEN FIELD	0920	0930	10	BREAK/LUNCH	BREAK	NA	NA	NA	WARM
04/22/2004	1	OPEN FIELD	0930	0941	11	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	WARM
04/22/2004	1	OPEN FIELD	0941	1115	94	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/22/2004	1	OPEN FIELD	1115	1140	25	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1140	1200	20	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1200	1255	55	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1255	1305	10	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1305	1355	50	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1355	1402	7	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1402	1440	38	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1440	1455	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/22/2004	1	OPEN FIELD	1455	1525	30	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/22/2004	1	OPEN FIELD	1525	1535	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	0630	0705	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	0705	0810	65	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	0810	0820	10	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/23/2004	1	OPEN FIELD	0820	0835	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	0835	0930	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	0930	0945	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	0945	1005	20	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	1005	1112	67	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	1112	1135	23	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	1135	1145	10	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	1145	1245	60	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	1245	1303	18	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	CHIP	LINEAR	SUNNY
04/23/2004	1	OPEN FIELD	1303	1420	77	COLLECT DATA	COLLECT DATA SOUTH TO NORTH	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	1420	1432	12	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY
04/23/2004	1	OPEN FIELD	1432	1501	29	COLLECT DATA	COLLECT DATA SOUTH TO NORTH B2 258 CHIPS	GPS	NA	LINEAR	SUNNY

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/23/2004	1	OPEN FIELD	1501	1515	14	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0610	0805	115	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0805	0815	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0815	0924	69	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY WARM
04/26/2004	1	OPEN FIELD	0924	0948	24	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	0948	1005	17	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY WARM
04/26/2004	1	OPEN FIELD	1005	1120	75	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY HOT
04/26/2004	1	OPEN FIELD	1120	1210	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/26/2004	1	OPEN FIELD	1210	1240	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/MOBILIZATION SETTING UP TEST AREA ROPE	NA	NA	NA	SUNNY HOT
04/26/2004	1	OPEN FIELD	1240	1325	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID C2	NA	CHIP	LINEAR	SUNNY HOT
04/26/2004	1	OPEN FIELD	1325	1340	15	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/27/2004	1	OPEN FIELD	0600	0720	80	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D2	NA	NA	NA	SUNNY WARM
04/27/2004	1	OPEN FIELD	0720	0845	85	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY WARM
04/27/2004	1	OPEN FIELD	0845	0855	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/27/2004	1	OPEN FIELD	0855	0935	40	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	0935	0946	11	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	0946	1035	49	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D2	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1035	1130	55	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID D2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	1130	1220	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1220	1254	34	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1254	1333	39	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2	NA	CHIP	LINEAR	SUNNY HOT
04/27/2004	1	OPEN FIELD	1333	1350	17	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/27/2004	1	OPEN FIELD	1350	1400	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
04/28/2004	1	OPEN FIELD	0600	0624	24	SETUP/DAILY START/ STOP/CALIBRATION	MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY WARM
04/28/2004	1	OPEN FIELD	0624	0718	54	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2	NA	CHIP	LINEAR	SUNNY WARM
04/28/2004	1	OPEN FIELD	0718	0734	16	SETUP/DAILY START/ STOP/CALIBRATION	MOBILIZATION SETTING UP TEST AREA ROPE GRID E2	NA	NA	NA	SUNNY WARM
04/28/2004	1	OPEN FIELD	0734	0835	61	COLLECT DATA	COLLECT DATA SOUTH TO NORTH GRID E2 TOTAL 233 HITS	NA	CHIP	LINEAR	SUNNY WARM
04/28/2004	1	OPEN FIELD	0835	0848	13	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	0848	0925	37	SETUP/DAILY START/ STOP/CALIBRATION	MOBILIZATION SETTING UP TEST AREA ROPE GRID F2	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	0925	1045	80	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F2	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1045	1200	75	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1200	1206	6	SETUP/DAILY START/ STOP/CALIBRATION	MOBILIZATION SETTING UP TEST AREA ROPE GRID F2	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/28/2004	1	OPEN FIELD	1206	1252	46	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F2 TOTAL 165 HITS	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1252	1305	13	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1305	1335	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY HOT
04/28/2004	1	OPEN FIELD	1335	1402	27	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2	NA	CHIP	LINEAR	SUNNY HOT
04/28/2004	1	OPEN FIELD	1402	1415	13	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	0605	0618	13	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0618	0657	39	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2	NA	CHIP	LINEAR	SUNNY WARM
04/29/2004	1	OPEN FIELD	0657	0714	17	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G2	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/29/2004	1	OPEN FIELD	0714	0800	46	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G2 TOTAL 155 HITS	NA	CHIP	LINEAR	SUNNY WARM
04/29/2004	1	OPEN FIELD	0800	0818	18	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0818	0858	40	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G3	NA	NA	NA	SUNNY WARM
04/29/2004	1	OPEN FIELD	0858	1011	73	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G3	NA	CHIP	LINEAR	SUNNY HOT
04/29/2004	1	OPEN FIELD	1011	1028	17	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1028	1042	14	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G3	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1042	1121	39	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G3 TOTAL 206 HIT	NA	CHIP	LINEAR	SUNNY HOT
04/29/2004	1	OPEN FIELD	1121	1215	54	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1215	1243	28	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F3	NA	NA	NA	SUNNY HOT
04/29/2004	1	OPEN FIELD	1243	1348	65	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F3	NA	CHIP	LINEAR	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/29/2004	1	OPEN FIELD	1348	1400	12	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
04/30/2004	1	OPEN FIELD	0605	0657	52	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0657	0741	44	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F3	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	0741	0753	12	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0753	0818	25	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E3	NA	NA	NA	SUNNY WARM
04/30/2004	1	OPEN FIELD	0818	0928	70	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID E3	NA	CHIP	LINEAR	SUNNY WARM
04/30/2004	1	OPEN FIELD	0928	0949	21	SETUP/DAILY START/ STOP/CALIBRATION	TOTAL 74 HITS SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
04/30/2004	1	OPEN FIELD	0949	1008	19	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/30/2004	1	OPEN FIELD	1008	1039	31	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY
04/30/2004	1	OPEN FIELD	1039	1151	72	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D3	NA	CHIP	LINEAR	SUNNY
04/30/2004	1	OPEN FIELD	1151	1251	60	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
04/30/2004	1	OPEN FIELD	1251	1317	25	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D3	NA	NA	NA	SUNNY
04/30/2004	1	OPEN FIELD	1317	1330	13	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D3 TOTAL 110 HITS	NA	CHIP	LINEAR	SUNNY
04/30/2004	1	OPEN FIELD	1330	1415	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C3	NA	NA	NA	SUNNY
04/30/2004	1	OPEN FIELD	1415	1425	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY
05/03/2004	1	OPEN FIELD	0605	0623	18	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C3	NA	NA	NA	SUNNY

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/03/2004	1	OPEN FIELD	0623	0814	111	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID C3 TOTAL 113 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/03/2004	1	OPEN FIELD	0814	0830	16	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/03/2004	1	OPEN FIELD	0830	0905	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID B3	NA	NA	NA	SUNNY WARM
05/03/2004	1	OPEN FIELD	0905	1020	75	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID B3 TOTAL 105 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/03/2004	1	OPEN FIELD	1020	1050	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A3	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1050	1150	60	BREAK/ LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1150	1313	83	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A3 TOTAL 105 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/03/2004	1	OPEN FIELD	1313	1327	14	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/03/2004	1	OPEN FIELD	1327	1400	33	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
05/03/2004	1	OPEN FIELD	1400	1405	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0605	0645	40	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY WARM
05/04/2004	1	OPEN FIELD	0645	0810	85	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A4	NA	CHIP	LINEAR	SUNNY WARM
05/04/2004	1	OPEN FIELD	0810	0818	8	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A4	NA	NA	NA	SUNNY WARM
05/04/2004	1	OPEN FIELD	0818	0838	20	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A4	NA	CHIP	LINEAR	SUNNY WARM
05/04/2004	1	OPEN FIELD	0838	0855	17	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0855	0940	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID B4	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	0940	0950	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	0950	1118	88	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID B4	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	1118	1218	60	BREAK/LUNCH	TOTAL 108 HITS LUNCH	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
05/04/2004	1	OPEN FIELD	1218	1257	39	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C4	NA	NA	NA	SUNNY HOT
05/04/2004	1	OPEN FIELD	1257	1410	73	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID C4 TOTAL 90 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/04/2004	1	OPEN FIELD	1410	1415	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/05/2004	1	OPEN FIELD	0615	0710	55	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D4	NA	NA	NA	SUNNY WARM
05/05/2004	1	OPEN FIELD	0710	0830	80	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D4 TOTAL 113 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/05/2004	1	OPEN FIELD	0830	0845	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/05/2004	1	OPEN FIELD	0845	0920	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E4	NA	NA	NA	SUNNY WARM
05/05/2004	1	OPEN FIELD	0920	1050	90	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D4 TOTAL 159 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/05/2004	1	OPEN FIELD	1050	1115	25	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/05/2004	1	OPEN FIELD	1115	1150	35	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F4	NA	NA	NA	SUNNY HOT
05/05/2004	1	OPEN FIELD	1150	1240	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
05/05/2004	1	OPEN FIELD	1240	1350	70	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F4	NA	CHIP	LINEAR	SUNNY HOT
05/05/2004	1	OPEN FIELD	1350	1400	10	SETUP/DAILY START/ STOP/CALIBRATION	TOTAL 101 HITS END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	0610	0655	45	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G4	NA	NA	NA	SUNNY WARM
05/06/2004	1	OPEN FIELD	0655	0727	32	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G4	NA	CHIP	LINEAR	SUNNY WARM
05/06/2004	1	OPEN FIELD	0727	0810	43	SETUP/DAILY START/ STOP/CALIBRATION	TOTAL 53 HITS SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID F5	NA	NA	NA	SUNNY WARM
05/06/2004	1	OPEN FIELD	0810	0825	15	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID F5	NA	CHIP	LINEAR	SUNNY WARM
05/06/2004	1	OPEN FIELD	0825	0837	12	BREAK/LUNCH	TOTAL 27 HITS BREAK	NA	NA	NA	SUNNY WARM

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/06/2004	1	OPEN FIELD	0837	0930	53	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID E5	NA	NA	NA	SUNNY WARM
05/06/2004	1	OPEN FIELD	0930	1025	55	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID E5 TOTAL 81 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/06/2004	1	OPEN FIELD	1025	1035	10	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	1035	1105	30	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID D5	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	1105	1201	56	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D5	NA	CHIP	LINEAR	SUNNY HOT
05/06/2004	1	OPEN FIELD	1201	1255	54	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	1255	1325	30	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID D5	NA	CHIP	LINEAR	SUNNY HOT
05/06/2004	1	OPEN FIELD	1325	1354	29	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C5	NA	NA	NA	SUNNY HOT
05/06/2004	1	OPEN FIELD	1354	1400	6	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/07/2004	1	OPEN FIELD	0610	0630	20	SETUP/DAILY START/STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID C5	NA	NA	NA	SUNNY WARM
05/07/2004	1	OPEN FIELD	0630	0800	90	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID C5 TOTAL 134 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/07/2004	1	OPEN FIELD	0800	0812	12	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/07/2004	1	OPEN FIELD	0812	0835	23	SETUP/DAILY START/STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID B5	NA	NA	NA	SUNNY WARM
05/07/2004	1	OPEN FIELD	0835	0945	70	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID B5	NA	CHIP	LINEAR	SUNNY HOT
05/07/2004	1	OPEN FIELD	0945	1000	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/07/2004	1	OPEN FIELD	1000	1035	35	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID BH5 TOTAL 151 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/07/2004	1	OPEN FIELD	1035	1110	35	SETUP/DAILY START/STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID A5	NA	NA	NA	SUNNY HOT
05/07/2004	1	OPEN FIELD	1110	1200	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT
05/07/2004	1	OPEN FIELD	1200	1255	55	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A5	NA	CHIP	LINEAR	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/07/2004	1	OPEN FIELD	1255	1310	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
05/07/2004	1	OPEN FIELD	1310	1332	22	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID A5	NA	CHIP	LINEAR	SUNNY
05/07/2004	1	YUMA EXTREME	1332	1350	18	SETUP/DAILY START/ STOP/CALIBRATION	TOTAL 151 HITS SETUP/ MOBILIZATION SETTING UP TEST AREA YUMA EXTREME	NA	NA	NA	SUNNY
05/07/2004	1	YUMA EXTREME	1350	1400	10	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY
05/10/2004	1	YUMA EXTREME	0610	0735	85	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G7	NA	NA	NA	SUNNY
5/10/2004	1	YUMA EXTREME	0735	1005	150	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G7 TOTAL 248 HITS	NA	CHIP	LINEAR	SUNNY
05/10/2004	1	YUMA EXTREME	1005	1020	15	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY
05/10/2004	1	YUMA EXTREME	1020	1130	70	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID G8	NA	NA	NA	SUNNY
05/10/2004	1	YUMA EXTREME	1130	1215	45	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method Explain	Pattern	Field Conditions
05/10/2004	1	YUMA EXTREME	1215	1415	120	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID G8 TOTAL 174 HITS	NA	CHIP	LINEAR	SUNNY HOT WINDY
05/10/2004	1	YUMA EXTREME	1415	1430	15	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT WINDY
5/11/2004	1	YUMA EXTREME	0545	0650	65	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID H8	NA	NA	NA	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0650	0810	80	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID H8 TOTAL 32 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0810	0827	17	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0827	0850	23	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID H7	NA	NA	NA	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0850	0957	67	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID H7 TOTAL 17 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/11/2004	1	YUMA EXTREME	0957	1030	33	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/11/2004	1	MOGUL	1030	1155	85	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRID J1 AND J2	NA	NA	NA	SUNNY WARM

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/11/2004	1	MOGUL	1155	1245	50	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY WARM
05/11/2004	1	MOGUL	1245	1405	80	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA MOGUL	NA	NA	NA	SUNNY
05/11/2004	1	MOGUL	1405	1410	5	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY WARM
05/12/2004	1	MOGUL	0545	0613	28	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS J1/J2, AND J3	NA	NA	NA	SUNNY WARM
05/12/2004	1	MOGUL	0613	0737	84	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID J1 AND J2	NA	CHIP	LINEAR	SUNNY WARM
05/12/2004	1	MOGUL	0737	0745	8	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY WARM
05/12/2004	1	MOGUL	0745	0844	59	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRIDS J1/J2, AND J3 TOTAL 181 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/12/2004	1	MOGUL	0844	0905	21	BREAK/LUNCH	BREAK	NA	NA	NA	SUNNY HOT
05/12/2004	1	MOGUL	0905	0955	50	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS J1/J2, AND J3	NA	NA	NA	SUNNY HOT
05/12/2004	1	MOGUL	0955	1100	65	BREAK/LUNCH	LUNCH	NA	NA	NA	SUNNY HOT



Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration, min	Operational Status	Operational Status Comments	Track Method	Track Method =Other Explain	Pattern	Field Conditions
05/12/2004	1	MOGUL	1100	1304	124	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRIDS I1/I2 AND I3 TOTAL 164 HITS	NA	CHIP	LINEAR	SUNNY HOT
05/12/2004	1	MOGUL	1304	1320	16	SETUP/DAILY START/ STOP/CALIBRATION	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	SUNNY HOT
05/13/2004	1	MOGUL	0535	0623	48	SETUP/DAILY START/ STOP/CALIBRATION	SETUP/ MOBILIZATION SETTING UP TEST AREA ROPE GRIDS H1/H2 AND H3	NA	NA	NA	SUNNY WARM
05/13/2004	1	MOGUL	0623	0815	112	COLLECT DATA	COLLECT DATA BI-DIRECTIONAL SOUTH TO NORTH GRID H1/H2 AND H3 TOTAL 143 HITS	NA	CHIP	LINEAR	SUNNY WARM
05/13/2004	1	MOGUL	0815	1215	240	DEMOBILIZATION	END OF TEST	NA	NA	NA	SUNNY HOT

Note: Activities pertinent to this specific demonstration are indicated in highlighted text.

## APPENDIX E. REFERENCES

1. Standardized UXO Technology Demonstration Site Handbook, DTC Project No. 8-CO-160-000-473, Report No. ATC-8349, March 2002.
2. Aberdeen Proving Ground Soil Survey Report, October 1998.
3. Data Summary, UXO Standardized Test Site: APG Soils Description, May 2002.
4. Yuma Proving Ground Soil Survey Report, May 2003.
5. Practical Nonparametric Statistics, W.J. Conover, John Wiley & Sons, 1980, pages 144 through 151.

## APPENDIX F. ABBREVIATIONS

AEC	=	U.S. Army Environmental Center
APG	=	Aberdeen Proving Ground
ASCII	=	American Standard Code for Information Interchange.
ATC	=	U.S. Army Aberdeen Test Center
EM	=	electromagnetic
EMI	=	electromagnetic interference
EMIS	=	Electromagnetic Induction Spectroscopy
ERDC	=	U.S. Army Corps of Engineers Engineering Research and Development Center
ESTCP	=	Environmental Security Technology Certification Program
EQT	=	Army Environmental Quality Technology Program
GPS	=	Global Positioning System
HFA	=	Human Factors Applications, Inc.
JPG	=	Jefferson Proving Ground
POC	=	point of contact
QA	=	quality assurance
QC	=	quality control
ROC	=	receiver-operating characteristic
RTK	=	real time kinematic
RTS	=	Robotic Total Station
SERDP	=	Strategic Environmental Research and Development Program
TBD	=	to be determined
\UXO	=	unexploded ordnance
YPG	=	U.S. Army Yuma Proving Ground



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